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OFFICE OF
CHEMICAL SAFETY AND
POLLUTION PREVENTION

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MEMORANDUM

SUBJECT: Re-evaluation of Propamocarb hydrochloride (Propamocarb-HCl) Estimated Drinking Water Concentrations (EDWCs) for Use in the Human Health Risk Assessment in Support of the Registration Review of Current Uses.

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EXECUTIVE SUMMARY

This memo summarizes the revised Estimated Drinking Water Concentrations (EDWCs) for propamocarb hydrochloride (propamocarb-HCl) in support of all of its current labelled uses. Propamocarb-HCl (CAS 25606-41-1), a fungicide, is the active ingredient in several registered pesticide products formulated as flowable, emulsifiable and soluble concentrates and applied as liquid (foliar spray, chemigation, and drench). Current labeled uses include: beans (Lima), ornamentals, potato, turf, vegetables (cucurbits and fruiting); plantations of x-mass and conifer trees; and vegetables in greenhouses (Cucurbits, leaf lettuce, peppers and tomatoes).

The revised **EDWCs** are those modeled for surface waters based on current labels and newly submitted fate and transport data for the registration review of propamocarb-HCl. The driver is the use on ornamentals with the following values: **4,860 ppb** of propamocarb-HCl for **acute exposure**, **385 ppb** of propamocarb-HCl for **non-cancer chronic exposure** and **205 ppb** of propamocarb-HCl for **cancer chronic**

exposure (Table 1).

Table 1 Modeled EDWCs summary (µg/L) for propamocarb in surface and ground water

Water Source	Acute	Non-Cancer Chronic	Cancer Chronic
Surface Water¹	4,860	385	205
Ground Water²	73	70	

¹ **Surface Water** values are from FLnurserySTD_V2 for the acute value and NJnurserySTD_V2 for the chronic values representing foliar application to ornamentals in nurseries

² **Ground Water** acute and chronic values are from FLCITRUS_STD.SCN GW scenario

(1) BACKGROUND

Several drinking water assessment were executed for propamocarb-HCl as follows:

- (a) The **2000 Assessment** (Drinking water memo of May 3, 2000; DP 259522): This assessment was for new use on potato and the previously registered uses on turf grass and ornamentals. The driver was application on **turf grass (25 lbs. a.i/A/year** in three applications at 7-day intervals). Tier I GENECC (should have used FIRST instead) and SCIGROW models were used to estimate DWCs in surface and groundwater, respectively. Assessment reported that the acute/chronic EDWCs for surface water are **1,003/1,002 ppb** and the acute & chronic value of **2.08 ppb** for groundwater;
- (b) The **2003 Assessment** (Drinking water memo of November 10, 2003; DP Barcode 267925): This assessment was for new use on cucurbits, fruiting vegetables, lettuce, pepper, potato, tomato and the previously registered uses on turf grass and ornamentals. Again, the driver was application on **turf grass (25 lbs. a.i/A/year** in three applications at 7-day intervals). Tier I FIRST and SCIGROW models were used to estimate DWCs in surface and groundwater, respectively. Assessment reported that the acute/chronic EDWCs for surface water are **972/77 ppb** (acute/chronic) and **2.99 ppb** (acute & chronic value) for groundwater;
- (c) The **2009 Assessment** (Drinking water memo of August 7, 2009; DP Barcode 359105): In this assessment, the 2003 assessment was re-evaluated along with the proposed new use on Lima beans. In this process, maximum number of applications for container-grown ornamentals were not specified and the reviewer calculated a conservative rate of 2,176 lbs. a.i/A/Y based on 17 applications of 128 lbs. a.i/A. Therefore, the driver was application on container-grown ornamentals (**128 lbs. a.i/A/year** in three applications at 21-day intervals). Tier I FIRST and SCIGROW models were used to estimate DWCs in surface and groundwater, respectively. Assessment reported that the acute/chronic EDWCs for surface water are **14,568/1,157 ppb** and **264 ppb** (acute & chronic value) for groundwater;
- (d) The **2013 Assessment** (Drinking water memo of February 6, 2013; DP Barcode 368070): In this assessment, the 2009 assessment was re-evaluated along with the proposed new use on Lima beans. In this process, the Agency requested the Registrants, in January, 2012, to mitigate identified label issues in order to arrive at more accurate estimation of application rates for ornamentals. The Registrants responded with new mitigated labels. Based on these new mitigated labels, Tier II PRZM/EXAMS modeling for surface water and Tier I SCIGROW modeling for ground water. For this 2013 assessment, the driver was application on container-grown ornamentals (**64.3 lbs. a.i/A/year** in two applications at the minimum application intervals of 7 days). Assessment reported that the acute/non-cancer chronic/cancer chronic EDWCs for surface water are **8,762/1,067/494 ppb** and **15.15 ppb** (acute & chronic

value) for groundwater;

This assessment is executed for **all current uses** of propamocarb-HCl based on the most recent labels. The reasons for the need for this assessment are:

- To use current models: The surface water calculator (SWCC) to estimate DWCs in surface water and PRZM-GW to estimate DWCs in groundwater; and
- To use current fate and transport parameters in the modeling exercise based on several studies submitted by the Registrant in response to the DCIs initiated previously as a result of propamocarb registration review of August 10, 2011.

(2) ***Revised EDWCs for Surface Water Sources***

The following steps were taken to arrive at the revised EDWCs for surface water by modeling using the Surface Water Concentration Calculator (SWCC)¹.

Step 1: labeled use patterns

There are four labels for the turf and ornamental use and three labels for the use on some vegetables, Lima beans, and x-mass/Conifer Tree plantations. Turf and ornamentals labels are: Banol **432-942** (Soluble Concentrate from Bayer); Proplant **55260-9** (Soluble Concentrate from Agriphar); V-10162 VPP **59639-143** (Flowable Concentrate from Valent); and Advan **83070-8** (Soluble Concentrate from Advan). Labels for vegetables, Lima beans, and x-mass/conifer tree plantations are: Previcure Flex **264-678** (Flowable Concentrate from Bayer); Promess **55260-10** (Emulsifiable Concentrate from Agriphar); V-10162 Premix **59639-142** (Flowable Concentrate from Valent).

Table 2 represents a summary for turf and ornamentals use patterns. The use rates stated in **Table 2** represent the current mitigated labels.

Table 2 Use rate for propamocarb-HCL on turf and ornamentals (refer to abbreviations¹)

Label	Use Pattern	MSR	MNA	MYR	MAI	Notes
Banol 432-942 (Bayer)	Turf	8.17	NS	25.0	7	For > 4" pots (refer to note below) ²
	Seeding/Seedling	45.9	2	91.9	7	
	Transplant Cutting	81.7+46.9	2	128.6	7	
	Woody Plants	63.8	2	127.6	7	
	Potting: 4"	64.3	2	128.6	7	
Proplant	Turf	8.17	NS	24.5	7	For > 4" pots (refer to note

¹ URL: <http://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/models-pesticide-risk-assessment#SWCC>

55260-9 (Agriphar)	Seeding/Seedling	45.9	2	91.9	7	below) ²
	Transplant Cutting	81.7+46.3	2	128.0	7	
	Woody Plants	63.8	2	127.6	7	
	Potting: 4"	64.3	2	128.6	7	
Advan 83070-8 (Advan)	Turf	8.17	NS	24.5	7	For > 4" pots (refer to note below) ²
	Seeding/Seedling	45.9	2	91.9	7	
	Transplant Cutting	81.7+46.3	2	128.0	7	
	Woody Plants	63.8	2	127.6	7	
	Potting: 4"	64.3	2	128.6	7	
VPP 59639-143 (Valent)	Turf	2.12	2	4.25	14	
	Ornamental	Use Omitted from Label				
Turf: Overall Application Parameters		8.2	3	24.6	7	Maximum rates/Number of applications/Minimum Intervals
Overall Application Parameters for Ornamentals		64.3	2	128.6	7	

¹ Abbreviations: **MSR**= Maximum Single Rate (lbs. a.i./A); **MNA**= Maximum Number of Applications; **MYR**=Maximum Yearly Rate (lbs a.i./A) assuming yearly rates= seasonal rates; **MAI**= Minimum Application Intervals (days); Number in Red is calculated. **Note:** values of **MNA** in red bold are calculated by dividing **MYR** over **MSR**.

² For pot sizes >4": It is assumed that the label yearly rate restricts the single rate per/pot and the number of pots that can be placed/treated per acre.

Table 3 represents a summary for use patterns on vegetables, Lima beans and x-mass/conifer tree plantations. The use rates stated in **Table 3** represent the current mitigated labels.

Table 3 Use rate for propamocarb-HCL on vegetables, Lima beans and x-mass/conifer tree plantations (refer to abbreviations¹; Type of Application: Aerial, Ground, Band & Chemigation)

Crop / Use Site	EPA Reg. No.	MSR	MNA	MYA	MAI
Cucurbit vegetables	59639-142	0.90	4	3.40	10
	264-678	0.90	NS	4.50	7
	55260-10	0.90	NS	4.50	7
v Cucurbits: Overall Application Parameters		0.90	5	4.50	7
v Fruiting vegetables		0.90	4	3.60	7
Peppers	59639-142	0.90	4	3.60	7
	264-678	0.90	NS	4.50	7
	55260-10	0.90	NS	4.50	7
v Peppers: Overall Application Parameters		0.90	5	4.50	7

Crop / Use Site	EPA Reg. No.	MSR	MNA	MYA	MAI
Tomatoes	59639-142	0.90	4	3.60	7
	264-678	1.13	NS	5.64	7
	55260-10	1.13	NS	5.64	7
√ Tomatoes: Overall Application Parameters		1.13	5	5.65	7
Lettuce (head and leaf)	59639-142	1.14	4	3.60	10
	264-678	1.50	NS	6.00	5
	55260-10	1.50	NS	6.00	7
√ Lettuce (head & leaf): Overall Application Parameters		1.50	4	6.00	7
√ Lima beans: One Label	264-678	1.50	NS (4)	6.00	7
Potatoes	59639-142	1.14	NS	3.60	NS
	264-678	0.90	NS	4.50	7
√ Potatoes: Overall Application Parameters		0.90	5	6.00	7
√ Lima Beans: One Label	264-678	1.50	NS (4)	6.00	7
√ X-mass/Conifer: One Label	59639-142	2.70	NS (2)	5.40	7

¹ **Abbreviations:** **MSR**= Maximum Single Rate (lbs. a.i./A); **MNA**= Maximum Number of Applications; **MYR**=Maximum Yearly Rate (lbs. a.i./A) assuming yearly rates= seasonal rates; **MAI**= Minimum Application Intervals (days); Number in Red is calculated.

√ Representative MSR, MNA, MYA and MAI

Step 2: Selection of use patterns, scenarios and the chemical parameters needed for modeling: Information and parameters needed for modeling are summarized in **Tables 4 and 5**.

Table 4 Modeled use patterns for propamocarb based on expected high exposure for each use pattern/application type (Refer to Abbreviations, below¹)

Use Pattern	Application Window²		Representative Scenario	MSR (kg/ha)	MNA	MAI
	Width	Steps				
Beans, Lima (Aerial/Ground application as foliar w/ drift; Modeled aerial only because aerial higher exposure)	70	14	ILbeansNMC	1.68	4	7
			MIbeansSTD			
Cucurbits (Same as Beans)	70	14	CAMelonsRLF	1.01	5	7
			FLcucumberSTD			
			MImelonStd			
			MOmelonStd			
			NJmelonStd			
			STXmelonNMC			
			STXvegetableNMC			
Fruiting vegetables (Others): See below for Tomatoes & Peppers: (Same as Beans)	70	14	PAvegetableNMC	1.01	4	7
			STXvegetableNMC			
Lettuce: Leaf & Head (Same as Beans)	70	14	CAlettuceSTD	1.68	4	7
			PAvegetableNMC			
			STXvegetableNMC			
Ornamentals: Seeding/Seedling; Nursery stock; Transplant Cutting; Woody shrubs & Vines and potted plants (Ground application as foliar spray; with drift)	160	14	CAnurserySTD_V2	72.08	2	7
			FLnurserySTD_V2			
			MIlurserySTD_V2			
			NJnurserySTD_V2			
			ORnurserySTD_V2			
			TNnurserySTD_V2			
Ornamentals: Seeding/Seedling; Nursery stock; Transplant Cutting; Woody shrubs & Vines and potted plants (Ground application as soil drench; no drift)	160	14	CAnurserySTD_V2	72.08	2	7
			FLnurserySTD_V2			
			MIlurserySTD_V2			
			NJnurserySTD_V2			
			ORnurserySTD_V2			
			TNnurserySTD_V2			
Pepper (Same as Beans)	70	14	FLpeppersSTD	1.01	5	7
Potatoes (Aerial/Ground application as foliar with drift; Modeled aerial only because aerial exposure is higher)	120	14	CAPotatoRLF_V2	1.01	5	7
			FLpotatoNMC			
			IDNpotato_WirrigSTD			
			MEpotatoSTD			
			WApotatoNMC			
Tomatoes (Same as Beans)	70	14	CAtomato_WirrigSTD	1.27	5	7
			FLtomatoSTD_V2			
			PAtomatoSTD			
Turf: Lawns, Turf and Sod farms (Ground application as foliar spray with drift; No aerial application allowed)	160	14	CATurfRLF	9.19	3	7
			FLturfSTD			
			PATurfSTD			
X-mass/Conifer Tree plantations (Same as Beans)	160	14	CAForestryRLF	3.03	2	14
			ORXmasTreeSTD			

¹ **Abbreviations:** **MSR**= Maximum Single Rate (lbs. a.i./A); **MNA**= Maximum Number of Applications; **MYR**=Maximum Yearly Rate (lbs. a.i./A) assuming yearly rates= seasonal rates; **MAI**= Minimum Application Intervals (days)

² **Window of Application:** Each run starts with 1st application at 7 days following crop emergence; 2nd at 7+ **MAI** and so on up to the last application. This process is repeated within the width of the window specified above at the steps specified above

Table 5 Summary of input parameters for modeling propamocarb-HCl (As per Parameter Guidance²)

<i>Input Parameter (Unit)</i>	<i>Value</i>	<i>References</i>
Koc (Average in L/Kg)	726	MRIDs: 412781-30; 458943-21; 487526-01/02
Aerobic Aquatic (t½ in days @ 20 °C)	20	487526-03 & 487526-04
Anaerobic Aquatic (t½ in days @ 20 °C)	168	One value 92 (MRID 445385-04) x 3= 184 days
Photolysis in Water (t½ in days @ pH 7)	Stable	MRID 000712-96
Hydrolysis (t½ in days)	Stable	MRID 000712-97
Aerobic Soil (t½ in days @ 25 °C)	28	MRIDs 412781-25; 412781-26; 412781-27 & 458943-19
Molecular Weight g/mole	224.73	Product chemistry
Vapor pressure (VP) torr @ 25 °C	6.0 x 10⁻⁷	MRID 433684-09
Solubility in Water(mg/L)	700,000	Product chemistry
Application Efficiency	99% for ground; 95% for Air; 100% for Drench	
Spray Drift Fraction	Ground= 0.066; Air= 0.135; Drench= 0.00	
Percent Crop Area (PCA)	100%	Multiple crops including ornamentals PCA Guidance³

A total of 309 model simulations were executed using the batch feature of the model. **Table 6** contains a summary of the results is summarized in **Table 6**.

² Guidance for Selecting Input Parameters in Modeling the Environmental Fate and Transport of Pesticides.

URL: http://www.epa.gov/oppefed1/models/water/input_parameter_guidance.htm#Przm

³ Development and Use of Percent Cropped Area and Percent Turf Area Adjustment Factors in Drinking Water Exposure Assessments: 2012 Update.

URL: http://www.epa.gov/oppefed1/models/water/pca_adjustment_dwa.pdf

Table 6 Summary of surface water EDWCs resulting from current propamocarb labeled uses

Use Pattern	Representative Scenario (days from emergence)	Peak	Yearly	overall
Beans, Lima (Aerial/Ground application as foliar w/ drift; Modeled aerial only because aerial higher exposure)	ILbeansNMC (+14; +70; +70)	137	16	10
	MIbeansSTD (+56; +56; +56)	140	20	9
Cucurbits	CAMelonsRLF (+70; +70; +70)	17	3	2
	FLcucumberSTD (+56; +0; +0)	147	10	5
	MImelonStd (+42; +42; +42)	84	8	4
	MOmelonStd (+42; +42; +0)	106	7	4
	NJmelonStd (+28; +28; +28)	132	9	4
	STXmelonNMC (+56; +56; +28)	168	11	5
	STXvegetableNMC (+0; +0; +0)	129	10	4
Fruiting vegetables, Others: Tomatoes & Peppers, below	PAvegetableNMC (+56; +0; +14)	65	7	4
	STXvegetableNMC (+0; +0; +0)	106	8	3
Lettuce: Leaf & Head	CAlettuceSTD (+0; +0; +0)	97	14	8
	PAvegetableNMC (+56; +0; +14)	108	12	7
	STXvegetableNMC (+0; +0; +0)	176	13	6
Ornamentals: Seeding/Seedling; Nursery stock; Transplant Cutting; Woody shrubs & Vines and potted plants (Ground/Foliar spray)	CAnurserySTD_V2 (+20; +20; +0)	1,210	126	59
	FLnurserySTD_V2 (+140; +100; +140)	4,860	258	147
	MIlurserySTD_V2 (+120; +100; +80)	1,000	147	110
	NJnurserySTD_V2 (+80; +0; +0)	2,470	385	205
	ORnurserySTD_V2 (+0; +0; +0)	1,430	237	139
	TNnurserySTD_V2 (+0; +0; +160)	2,670	267	135
Ornamentals: Seeding/Seedling; Nursery stock; Transplant Cutting; Woody shrubs & Vines and potted plants (Ground/Soil drench)	CAnurserySTD_V2 (+0; +0; +0)	722	69	21
	FLnurserySTD_V2 (+140; 100; +140)	4,010	209	116
	MIlurserySTD_V2 (+120; 100; +140)	737	105	66
	NJnurserySTD_V2 (+0; +0; +0)	1,860	252	120
	ORnurserySTD_V2 (+0; +0; +0)	1,060	175	82
	TNnurserySTD_V2 (+0; +0; +160)	2,460	241	110
Pepper	FLpeppersSTD (+28; +28; +28)	188	11	6
Potatoes	CAPotatoRLF_V2 (+56; +0; +0)	22	3	2
	FLpotatoNMC (+70; +0; +0)	88	10	5
	IDNpotato_WirrigSTD (+70; +70; +56)	37	8	7
	MEpotatoSTD (+112; +112; +112)	57	16	11
	WApotatoNMC (+70; +112; +98)	35	6	4
Tomatoes	CAtomato_WirrigSTD (+14; +0; +0)	44	6	4
	FLtomatoSTD_V2 (+56; +56; +70)	198	13	7
	PAtomatoSTD (+56; +14; +28)	101	9	6
Turf: Lawns, Turf and Sod farms	CATurfRLF (+ 0; + 0; +0)	140	23	15.9
	FLturfSTD (+112; +42; +42)	153	12.6	7.06
	PATurfSTD (+140; +140; +140)	402	35.3	15.9
X-mass/Conifer Tree plantations	CAForestryRLF (+0; +0; +0)	95	18	9
	ORXmasTreeSTD (+0; +0; +0)	51	9	5
Maximum EDWCs for All Current Uses		4,860	385	205

PRZM-GW modeling was executed based on the maximum application rate for all of the current labelled uses (ornamentals: 2 x 64.3 lbs. a.i./A = 72.08 x 2 kg a.i./ha) using all of the current PRZM-GW scenarios. The highest EDWC value was obtained from the FLCITRUS_STD scenario.

Estimated groundwater concentrations and breakthrough times for propamocarb are presented in **Table 7** for the Florida Citrus - FL Central groundwater scenario. A graphical presentation of the daily concentrations in the aquifer is presented in **Figure 1**. These values were generated with the PRZM-GW (Version 1.07). Critical input values for the model are summarized in **Tables 8 & 9**.

Table 7 Groundwater results propamocarb and the Florida citrus scenario

Peak Concentration (ppb)	72.8
Post-Breakthrough Mean Concentration (ppb)	69.9
Entire Simulation Mean Concentration (ppb)	36.7
Average Breakthrough Time (days)	8,022.752 (22 Years)
Throughputs	1.366115

Table 8 Chemical properties for groundwater modeling of propamocarb

Koc (ml/g)	726
Surface Soil Half Life (days)	28
Hydrolysis Half Life (days)	Stable (0)
Diffusion Coefficient Air (cm ² /day)	0.0
Henry's Constant	0.0
Enthalpy (kcal/mol)	0.0

Table 9 Pesticide application scheme used for propamocarb. This application scheme was applied every year of the 30 year simulation

<i>Application Days Relative to Emergence Date</i>	<i>Application Method</i>	<i>Application Rate in kg a.i./ha and in (lbs. a.i./A)</i>
0	Ground application with mass distribution increasing proportionally with depth to 4 cm	72.08 (64.3)
7		72.08 (64.3)

Figure 1 Aquifer breakthrough curve for propamocarb and the Florida citrus scenario

